

**Sustainability of Interior Design materials for 5\* Hotels in  
the UAE**

استدامة مواد التصميم الداخلي لفنادق الخمس نجوم  
في الإمارات العربية المتحدة

by

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## **Abstract**

The study aimed to gain insights from the interior designers regarding the implementation of sustainability in the luxury five-star hotels' interior design in the context of the UAE. To achieve this primary aim, the following objectives were outlined: to evaluate the implementation of sustainability in the UAE's five-star hotels' interior design; to analyse how LEED guidelines are incorporated into the hotels' interior design in the UAE; to assess the challenges in integrating sustainability in luxury hotel interiors in the UAE; to examine the sustainable choice of materials by the interior designers for the UAE hotels' interior design. For this, a qualitative approach was selected, and semi-structured interviews were carried out with six specialist interior designers. Using a template thematic analysis approach, it was identified that there is a disconnect between sustainability and luxury, but that integrating sustainability in the UAE's hotels is encouraged. LEEDs guidelines are only used when the project itself specifies the usage. However, some participants try to incorporate the guidelines during their choice of materials. In addition, the most significant challenges to incorporating sustainability were identified as being related to cost and client resistance. The study also developed an understanding of the commonly used materials in interior design and their sustainability ratings based on the participants. The implications of the study are discussed, and some recommendations are provided.

## المستخلص

هدفت الدراسة إلى اكتساب رؤى متعمقة من مصممي الديكور الداخلي فيما يتعلق بتنفيذ الاستدامة في التصميم الداخلي للفنادق الفاخرة من فئة الخمس نجوم في سياق دولة الإمارات العربية المتحدة، ولبوغ هذا الهدف الأساسي، تم تحديد الأغراض التالية: تقييم تنفيذ الاستدامة في التصميم الداخلي للفنادق من فئة الخمس نجوم في دولة الإمارات العربية المتحدة؛ تحليل كيفية دمج إرشادات LEED (الريادة في تصميمات الطاقة والبيئة) في التصميم الداخلي للفنادق في دولة الإمارات العربية المتحدة؛ تقييم التحديات التي تواجه دمج الاستدامة في التصميمات الداخلية للفنادق الفاخرة في دولة الإمارات العربية المتحدة؛ دراسة اختيار مصممي الديكور الداخلي للفنادق في دولة الإمارات العربية المتحدة المستدام للمواد المستدامة. وتحقيقاً لذلك، تم اختيار نهج نوعي، وأجريت مقابلات شبه منظمة مع ستة من مصممي الديكور الداخلي المتخصصين. وباستخدام نهج تحليل موضوعي نموذجي، تبين وجود انفصال بين الاستدامة والرفاهية، ولكن دمج الاستدامة موضع تشجيع في فنادق الإمارات العربية المتحدة، حيث تُستخدم إرشادات LEEDs فقط عندما يفرض المشروع نفسه استخدامها. ومع ذلك، يحاول بعض المشاركين دمج هذه الإرشادات أثناء اختيارهم للمواد. إلى جانب ذلك، تبين أن أهم التحديات التي تواجه دمج الاستدامة مرتبطة بالتكلفة ومقاومة العملاء، كما طورت الدراسة فهماً للمواد شائعة الاستخدام في التصميم الداخلي وتقييمات الاستدامة الخاصة بها من وجهة نظر المشاركين. جرت مناقشة الآثار المترتبة على الدراسة، وتقديم بعض التوصيات.

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## **Chapter 1 Introduction**

### **1.1 Study Background and Research Context**

Sustainability has been a widely discussed topic with businesses across the globe trying to reduce the impact of their operations on the environment, economy, and society, as a whole (Journeault, 2016). The concern regarding lack of sustainability stems from the harmful activities that organisations engage in such as waste generation and toxic emissions, which lead to or exacerbate environmental pollution (Geng et al., 2010). This is particularly relevant in the case of the hospitality sector that is accused of excessive solid waste generation (Singh, Sundari, & Nath, 2015). While there are several sustainability-related studies that have been carried out, much of these focus on the construction and manufacturing sectors (Yevu et al., 2020; Harik et al., 2015). Thus, there is limited attention that has been paid to sustainability issues within the hospitality sector. This gap is even wider in the context of the UAE's luxury hotel sector. This is cause for concern because the value of the UAE's hospitality industry has been projected to reach a total of US\$ 7.6 billion by the year 2022 which depicts a 5-year Compound Annual Growth Rate (CAGR) of around 8.5% (Sadaqat, 2018). Sadaqat (2018) further noted that in Dubai alone, the supply of hotels would increase to approximately 132,000 hotels by the end of 2019. Moreover, Alsammarae (2019) outlined that the UAE represents at least 73 per cent of the luxury hotel market of the GCC with the only 7-star luxury hotel of the world located in the country.

While studies done so far have assessed the operations of the firms and assessed their impact on the environment (Journeault, 2016), limited studies addressed the sustainability in the buildings' interior design. However, a recent study conducted by Moubarak and Qassem (2018) reflected that sustainable interior design practices could not only enhance the aesthetics of the built environment but also leads to benefits like energy savings, reduction of emission, and promotion of occupants' physiological and psychological health. In contrast to traditional interior design practices, the sustainable practices focused on health impacts, environment, focuses on materials, as well as maintenance and ease of deployment (Moussatche, King, & Roger, 2002; Moubarak & Qassem, 2018). Such ideas are also echoed by Afacan (2014), who commented that interior design constitutes

one of the key aspects of building sustainable architecture and thus, sustainable design development is important for interior design.

Despite such indications by the prior researchers, sustainability aspects have not been clearly addressed by past researchers in the context of interior designs. However, research suggests that there is a growing trend in the GCC (particularly in the UAE and KSA) towards the implementation of sustainability in the building construction (Asif, 2016). Such arguments can also be supported by Mushtaha et al. (2019), who noted the application of sustainability criteria in assessing heritage and modern buildings in the UAE. With the move towards sustainability and sustainable systems, the Leadership in Energy and Environmental Design (LEED) system has been adopted across the world so much so that it has become the most widely used Green Building Rating System (GBRS) (Gobbi et al., 2016). In the UAE, in particular, the rate of diffusion of LEED in the past decade is around 45% which is the highest in the MENA region (Ismaeel, 2019). However, there is little to no research that exists within the hospitality sector and more specifically, in the context of sustainable interior design that can lead to improved Indoor Environmental Quality (IEQ). The present study thus focuses on LEED parameters and assesses how such guidelines are implemented by the interior designers to ensure the sustainability of the hotel interiors.

However, Alameeri et al. (2018) noted that the UAE's hotels are adopting sustainable practices. As noted by Hatemi (2016), the country as a whole promotes sustainable economic strategy with hotels' sustainability is one of the key focus areas (Alameeri et al., 2018). Todorova (2013) also noted that Emirates Green Building Council had encouraged hotels to adopt eco-friendly and sustainable practices. Apart from this scattered evidence, other studies conducted in the hotel industry, in general, are conducted in the supply chain (Al-Aomar & Hussain, 2017) or assessed the challenges of implementing sustainability in the luxury properties (Giardina, 2019). Such gaps clearly indicate the need to conduct a detailed analysis of the hotel industry in the UAE and how five-star hotels are ensuring the sustainability of the interior of the building. The present research addresses this gap and undertakes a detailed analysis of the sustainability of the hotel interior designs.

## 1.2 Research Rationale

The paucity of research indicates the need for further analysis in this context and provides the rationale for conducting the study. The majority of the studies on sustainability have either focused on the construction or manufacturing industries (Yevu et al., 2020; Harik et al., 2015). The hospitality sector, especially five-star properties, has remained an understudied domain in terms of their approach towards sustainability. Although studies conducted by Dos Santos, Méxas, and Meiriño (2017) assessed sustainability orientation of hotels, the study has not addressed the context of the UAE nor has it studied the interior design aspects of hotels. Similar gaps are evident in the research studies conducted by Fukey and Issac (2014) and Asadi et al. (2020). From the above, it is clear that little focus has been laid on how sustainability is incorporated in the hotels' interior design elements.

However, as highlighted by researchers like Moubarak and Qassem (2018), the sustainable interior can bring a number of positive outcomes like energy saving, the health of the occupants, and less wastage. Such benefits indicate the need to implement sustainability into the interior design practices to enhance the performance of the indoor environment and optimise its performance. This forms the core of the present research. Moreover, as interior designers move from traditional designing to sustainable design strategies, there is increasing concern regarding the choice of materials and other maintenance aspects (Moussatche, King, & Roger, 2002). Furthermore, Mathur and Khanna (2017) have also stated that by embracing sustainability in the hotels, the hotels can also gain higher competitive advantage in the market. In addition, Stylos and Vassiliadis (2015) have reported that five-star hotels are often the ones who don't engage in environmental and sustainable practices LEED is the most widely used guideline for sustainable building construction in the UAE (Ismaeel, 2019), can guide such material choice and direct the interior designers towards the sustainable choice. Following such views, the present research aims to assess how LEED can be incorporated for optimal performance of the indoor environment of the five-star hotels in the UAE. It also analysed how the interior decorators ensure the sustainability of the material choice and apply LEED guidelines in the hotels' interior design.

### **1.3 Significance of the research**

The research can significantly contribute to the chosen domain of the research. The paucity of research can be addressed in this study by generating a rich analysis of sustainability implementation in the five-star hotels' interior design. In addition, the research will also create new insights and knowledge in the context of the UAE and show the sustainability approach of the hotels. Furthermore, the significance lies in providing a clear understanding of the sustainable material choices that the study aims to gain from the insights of the interior designers. Their inputs and suggestions enriched the study and offered guidance to better implement sustainability in the hotels' interior design.

### **1.4 Research Objectives and Questions**

The study aims to gain insights from the interior designers regarding the implementation of sustainability in the luxury five-star hotels' interior design in the context of the UAE. The below sections highlight the research objectives and questions.

#### **1.4.1 Research Objectives**

- To evaluate the implementation of sustainability in the UAE's five-star hotels' interior design
- To analyse how LEED guidelines are incorporated into the hotels' interior design in the UAE
- To assess the challenges in incorporating sustainability in luxury hotel interiors in the UAE
- To examine the sustainable choice of materials by the interior designers for the UAE hotels' interior design

#### **1.4.2 Research Questions**

- How is sustainability implemented in the UAE's five-star hotels' interior design?
- How are LEED guidelines incorporated into the hotels' interior design in the UAE?
- What are the challenges in incorporating sustainability in luxury hotel interiors in the UAE?

- How do the interior designers ensure a sustainable choice of materials for the UAE hotels' interior design?

## **1.5 Structure of the Dissertation**

The dissertation is structured in the following manner:

### **Chapter 2: Literature review**

This chapter will outline and critically analyse the sustainability in the interior design as well as in the context of the hospitality sector. This chapter will also provide an understanding of the current practices into the sustainable interior design and apply the same to the context of the hospitality industry in the UAE.

### **Chapter 3: Research Methodology**

This chapter will provide an overview of the design of the study, underlying philosophical worldview and approach, and offer justification for the given selection. Furthermore, this chapter will also outline the research instrument and justify the research design.

### **Chapter 4: Findings and Discussion**

This chapter will present the results and analyse them using a qualitative analysis technique. Furthermore, this chapter will also present a critical discussion of the findings against the core concepts identified in the literature review.

### **Chapter 5: Conclusions, Recommendations, and Limitations**

This chapter will conclude the entire study. It will also provide practical and theoretical contributions to the hospitality industry of the UAE and also outline the limitations of the study.



## **Chapter 2 Literature Review**

### **2.1 Introduction**

The present research aims to understand the current sustainable practices used for interior décor finishes in the UAE's 5-star hotels. In order to address this, a comprehensive and critical analysis is carried out in this chapter that draws out perspectives of the existing authors in this research area. The chapter analyses the importance of sustainability in interior design and the same in the context of the hospitality industry. In addition, it entails a detailed discussion on sustainable practices and material use along with LEED guidelines. Following this, the strategies to incorporate sustainability in interior design have also been discussed shedding light on the guests' sustainable consumption behaviour.

### **2.2 Concept of sustainability**

The concept of sustainability has been popularised among environmental activists due to the growing concern of air pollution and natural resource depletion (Walker & Brammer, 2012). In order to address this, the organisations around the world are increasingly focusing on their activities to reduce their impact on nature (Walker & Brammer, 2012). The concept of sustainability is closely related to the triple bottom line framework that emphasises three aspects of sustainability, namely, social, environmental, and economic (Meehan & Bryde, 2011). However, as noted Salas-Zapata and Ortiz-Muñoz (2019), there exist considerable dilemma over what the term actually signifies. According to the authors, "sustainability is understood as the integration or the application of social-ecological criteria or qualities to the planning, designing and/or functioning stages of certain reference systems" (p.3). This definition is closely related to the chosen context of the research as it attempts to analyse the application and integration of sustainability in the interior décor practices and material choice.

Despite this growing concern, research on sustainability has primarily focused on the construction or manufacturing sector (Kylili & Fokaides, 2017; Olawumi & Chan, 2018). Limited attention has been laid in the service sector and particularly to the hotel industry. Furthermore, whatever studies have done so far in the hotel sector (Dos Santos, Méxas, & Meiriño, 2017; Kim,

Barber, & Kim, 2019) do not provide an adequate understanding of how the context of the UAE. This is the gap the present study attempts to bridge.

### **2.3 Sustainability in the luxury hotel sector design**

In the hospitality sector, the environmental footprint is quite high as it consumes volume of resources, generates considerable solid waste, and has high carbon footprint (Bhutto et al., 2020; Hu Huang, Kuo, Chen, & Hsu, 2015; Singh, Sundari, & Nath, 2015). Owing to the increasing in international tourism, Sourvinou and Filimonau (2018) commented that the environmental impacts of the hotels would increase. Such evidence clearly indicates the need for implementation of sustainability from the design phase of the luxury hotel construction.

In luxury hotels, the concern related to sustainability begins with design (Padma & Ahn, 2020; Sozer, 2010). This is due to the fact, as noted by Padma and Ahn (2020), that hotel related attributes are crucial for the satisfaction of guests. Similarly, Withiam (2011) argued that if the design is ineffective, the hotel operators have to face multiple challenges. Sustainable design not only considers resource conservation, but also promotes operational efficiency and health of the occupants, maintains luxury standards and aesthetics, ensures customers' satisfaction, and optimises shareholders' return (Abdelrazaq, 2017; Ahn & Pearce, 2013; Withiam, 2011). For example, Ahn and Pearce (2013) noted the key design features in the luxury hotels include spaciousness, exotic materials, and sophisticated ambience and lighting. However, as noted by the authors, 'such exotic features often are in conflict with the parameters of sustainability that focuses on reducing environmental footprint. Green building principles as understood by Reed (2009) and Zhao et al. (2019) considers the entire lifecycle of the building starting from design, construction, building operation and its final demolition. Zhao et al. (2019) further outline that green building simply means that ecological principles have been followed in the design and construction of a building. With the use of green building practices, the indoor environment can be maintained as healthy, and various issues can be resolved (Geng et al., 2019; Ahn, Pearce, & Ku, 2011).

It is because of these benefits that several hotels are adopting green and sustainable management practices to ensure the limited impact of hotels on the environment (Reid, Johnston, & Patiar, 2017). For instance, they are focusing on land use, water and energy efficiency, pollution and

waste management, and implementing innovation (Wei, Ramalho, & Mandin, 2015). Anthonisz (2014) noted that several innovations are also done in line with the concept of sustainability. The authors conducted a study in Dubai hotels like Marriott that have implemented and back-end operational system for efficient room servicing. Reid, Johnston, and Patiar (2017) also stated that such innovative practices could significantly enhance the sustainability outcomes of the buildings. A study conducted by Sozer (2010) in Turkey hotels noted that passive solar design techniques could effectively reduce energy consumption and construct a building envelope that can address thermal conditions and maintain heating and cooling conditions. Apart from these few studies, there is limited knowledge of how sustainability is incorporated from the foundation of hotels' design. Majority of the studies done so far have focused on sustainable management practices (Reid, Johnston, and Patiar, 2017; Wei, Ramalho, & Mandin, 2015) rather than the technical design-related considerations. The present study thus focuses on sustainability in the context of interior design.

#### **2.4 Sustainability in interior design**

In the context of interior design, the social obligations of the architects and designers have been emphasised recently (Azzopardi-Muscat et al., 2020; Anderson, Honey & Dudek, 2010; Lee, 2014). The reason behind this is the increasing importance of upholding ethical conduct of the interior design professionals for the public good and societal benefits (Azzopardi-Muscat et al., 2020; Gurel, 2010). Therefore, the interior design experts are now considering sustainable design as a standard for adopting practices relating to their selection of materials and building methods and systems for addressing the environmental issues (Lee, 2014). Traditional interior design primarily focused on the aesthetic enhancement of the interior environment that ignored the environmental aspect of reduction of emissions, pollution and occupants' health (Yang, Fenghu & Xiaodong, 2011). However, more recently Environmentally Sustainable Interior Design (ESID) has sparked interest in sustainability (Jones, 2008) and professionals in this field have realised the importance of environmental sustainability of built environment (Mazarella & Lipner, 2011).

The core of ESID is the principle of sustainable design to promote both physiologically as well as psychologically comfortable and healthy indoor experience (Kang & Gruen, 2009). As noted by the author, sustainable interior designs can benefit human health to reduce the negative impact on

the environment. It is because of these reasons that an emphasis has been given on increasing the usage of locally available materials, durable materials, and the adoption of renewable resources (Bacon, 2011). As noted by Lee, Allen, and Kim (2013), the adoption of such sustainable practices of interior design reduces the impact on the environment and health due to improper selection of material. In particular, the authors noted that often flooring materials could cause health issues in the occupants due to dust and other pollutants. A prior study revealed the detrimental impact of carpet for causing asthma (Jaakkola et al., 2006). In addition to this, PVC is also related to allergies, asthma, and various other types of chronic diseases among children (Larsson et al., 2010). Thus, indoor air quality can be improved by adopting sustainable practices of construction and renovation and suitable material selection (Bacon, 2011; Allen, and Kim, 2013). Moreover, design improvements related to ventilation that can help reduce respiratory disorders as well as increase productivity (Loftness et al., 2007). Winchip (2007) stated that it is recommended that the designers use adaptable and durable finishes and reuse the furniture if possible. This can reduce waste and prolong the life of the product, which also reduces waste and impact on the environment.

In addition, it was argued by Bumgardner and Nicholls (2020) that the use of sustainable practices such as reuse of furniture can also increase the competitiveness of the firm. Thus, it can be stated that sustainability has significant importance in interior design as it not only affects the earth's resources but also has a potential impact on human health and company advantage. While the aesthetics of the design is important, it is also important to be mindful of the various sustainable practices to reduce environmental impact. The furnishing of the interior plays a significant role in ensuring the sustainability of the buildings (Hayles, 2015). In the interior design industry, the purpose is to eliminate any kind of adverse environmental impact and implementing a sensitive design that can create a healthy indoor environment that is sustainable and promotes psychological and physiological comfort of the occupants (Allen, and Kim, 2013). It is because of this reason, the key role of the interior designers have been repeatedly emphasised by prior research scholars (Hayles, 2015; Allen, and Kim, 2013). Following such arguments, the present research attempts to capture the sustainable material choice of the interior designers for constructing sustainable hotel designs in the UAE.

### **2.4.1 Sustainability and Interior Design in the hospitality sector**

Since the present study is based on the hospitality industry, it is important to understand the significance of design as well as the sustainability within the sector along with the interplay between the two. As revealed by Ahn & Pearce (2013), there is a potential conflict between two aspects, i.e., sustainability and design, in the context of the hospitality industry. The hoteliers, on the one hand, are providing a luxury environment to enhance guest satisfaction as well as adopting practices to achieve their sustainability goals (Ahn & Pearce, 2013). For instance, several international hotel chains are creating a theme of boutique hotels and providing the guests with an ultimate experience of luxury, style, and comfort that is quite intriguing (Baek et al., 2020; Heide & Gronhaug 2009). As noted by the authors, these hotels are primarily concerned with aesthetics and thus, focus on high fashion, design, and distinctive features of the interior. Therefore, in order to maintain high interior designs, the hotels often compromise on sustainability and use those materials that uphold the design aesthetics (Heide & Gronhaug, 2009). Although the luxury status of the brand is improved (Cohen & Bodeker, 2008), such luxury attributes often create a potential conflict with sustainability, green building practices that focuses on minimising environmental impact (Ahn & Pearce, 2013). For instance, Moscardo (2017) noted that luxurious hotels often report high use of chemicals for cosmetic maintenance and cleaning that impact the interior environment of the hotel. Therefore, there is a trade-off between interior design on the one hand and sustainability on the other (Moscardo, 2017).

However, as stated by Han & Kim (2010), the hospitality industry is now focusing on environmental sustainability. To this end, many hospitality brands have now implemented programs that help to reduce environmental consequences due to the consumption of various kinds of hospitality products or services (Chan, 2008). For instance, Ahn & Pearce (2013) noted that luxury boutique hotels are now using low volatile organic compound (VOC) emitting materials in order to control air contaminants. Wills (2015), in this regard, noted that a five-star hotel brand had adopted eco-friendly and sustainable practices. Its Planet 21 program covers a wide range of sustainability goals that includes ensuring healthy hotel interiors. Although research has been carried out regarding sustainable interior design practices, there is a limited understanding of the same in the context of the hotel industry. Given the conflicting nature of the priorities of the hoteliers, as pointed out by

Ahn & Pearce (2013), it is extremely important to understand the sustainable interior practices adopted by the luxurious hotels.

Research by Stylos and Vassiliadis (2015) has outlined that luxury five-star hotels are often the one who don't engage in environmental and sustainable practices. They evaluated the use of sustainable and environmental practices based on the hotel's luxury rating and found that the more luxury the hotel is, the less sustainable their practices are. Furthermore, the researcher also found that there is no influence of the location of the hotel. However, the research was conducted in Greece. However, on the other hand, another research conducted by Mathur and Khanna (2017), in the context of India, found that some of the primary five star hotels in the city of Delhi, are engaging in sustainable practices and have obtained substantial competitive advantage as a result of the same. Therefore, it can be said that the context changes the use of sustainability practices in five star hotels. However, there is very limited research of this nature in the UAE's or the GCC's context. The next section highlights the various sustainable interior design practices and use of materials.

#### **2.4.2 LEED guidelines on sustainability in the hotel sector**

Leadership in Energy and Environmental Design (LEED) rating system was developed by US Green Building Council (USGBC) and offer guidance on construction, design, as well as operation of green buildings (Robinson, Singh, & Das, 2016). Among the building professionals, the rating system has become popular and has been implemented in various stages of sustainable building design. The guideline focuses on various aspects such as waste management, stormwater management, purchase from regional suppliers, open spaces and the like (Robinson, Singh, & Das, 2016). Although all of these are not specific to the context of the hospitality sector, LEED has been recognised as a global rating system and tool for assessing sustainability criteria and eliminating any scope of subjective evaluation of sustainability (Robinson, Singh, & Das, 2016; Behnke, 2017; 2018).

As noted by Agarwal and Das (2019), LEED guidelines rate the performance of a building based on multiple criteria and credits are given to each of the criteria. Among these parameters, emission to the atmosphere and energy use are the two most important criteria that have specific relevance in the context of hospitality. Agarwal and Das (2019) stated that the third category, as

emphasised in the LEED guideline, relates to human health and entails thermal comfort, daylight infiltration, air quality, and connection to the outdoors. All these aspects relate to the indoor environment of the building. As noted by Reid, Johnston, and Patiar (2017), water usage is also one of the determining elements in the hospitality sector that have also been covered in the LEED guideline.

LEED V4 has developed separate guidelines for interior design in the context of hospitality (LEED, 2019). It has formulated prerequisites and credit for water efficiency, energy and atmosphere, materials and resources, IEQ, and innovation. For instance, in terms of IEQ, the guideline specifies the requirement for ventilation, outdoor airflow, and indoor air quality (LEED, 2019). In addition to this, the guideline calls for adherence to content standards and emissions for six categories of materials used in the indoor environment. The below table 1 provides a detailed view of the requirements.

Table 1: Content standards and emission requirements

(Source: LEED, 2019, p.58)

Category	Threshold	Emissions and content requirements
Interior paints and coatings applied on site	At least 90%, by volume, for emissions; 100% for VOC content	<ul style="list-style-type: none"> <li>General Emissions Evaluation for paints and coatings applied to walls, floors, and ceilings</li> <li>VOC content requirements for wet applied products</li> </ul>
Interior adhesives and sealants applied on site (including flooring adhesive)	At least 90%, by volume, for emissions; 100% for VOC content	<ul style="list-style-type: none"> <li>General Emissions Evaluation</li> <li>VOC content requirements for wet applied products</li> </ul>
Flooring	100%	General Emissions Evaluation
Composite wood	100% not covered by other categories	Composite Wood Evaluation
Ceilings, walls, thermal, and acoustic insulation	100%	<ul style="list-style-type: none"> <li>General Emissions Evaluation</li> </ul>
Furniture	At least 90%, by cost	Furniture Evaluation

Therefore, LEED has developed guidelines for building design and construction, interior design and construction, and operation and maintenance of the buildings in the hospitality sector (LEED, 2019). These guidelines have been incorporated by hoteliers, and Behnke (2018) noted that the LEED-certified hotels are more water and energy-efficient than non-LEED certified ones. In addition, the study revealed reduced carbon footprint of the LEED-certified hotels and thus are more efficient (Behnke, 2018).

## **2.5 Sustainable interior décor practices and materials used.**

Often, the two terms, green and sustainability are used interchangeably; however, they have differences. As stated by Hayles (2015), while the former focuses primarily on individual health and safety, the latter suggests a broader, holistic and global perspective that is concerned about the environment and the planet as a whole. The concept of ESID encompasses both the abovementioned concepts and implies the responsibility of the interior décor professionals to adopt sustainable interior design practices for both new constructions as well as renovating the existing one (Hayles, 2015). This sort of comprehensive approach is required in which all the systems are designed, and materials are chosen with the focus on minimising environmental impact (Kang & Guerin, 2009).

### **2.5.1 Sustainable interior design practices**

There exist a number of practices related to sustainable design practices. For instance, interior paint contains formaldehyde and other heavy materials or what is commonly known as VOC which, according to WHO (World Health Organization), increases the chances for lung cancer (Sorrell, 2009). Therefore, LEED guidelines established a threshold of compliance and stated that VOC emissions have to reduce by 100% (LEED, 2019). In addition, for interior paints, the guideline has set the General Emission Evaluation requirement that evaluates the content of coatings and paint of ceiling, walls, and floor (LEED, 2019). The LEED guideline also stated that the building products must be evaluated to determine its compliance with the standard method v1.1–2010 as prescribed by the California Department of Public Health (CDPH) in the actual exposure scenario. Furthermore, VOC limits for paints, coatings, and wet-applied substances are also set by other regulatory agencies



like California Air Resources Board (CARB) 2007, SCM (Suggested Control Measure) for Architectural Coatings and Rule 1113 of South Coast Air Quality Management District (SCAQMD) (LEED, 2019). These guidelines, therefore, promote eco-friendly and sustainable practices and makes it obligatory for the interior designers to comply with the stipulated regulatory guidelines. In this regard, Sorrell (2009) noted that Aglaia, earthborn, Auro, Biofa, and Ecos are the five best eco-friendly paints that are produced from natural ingredients, free from petrochemicals, and therefore are sustainable.

Although there are regulatory requirements and awareness towards the adoption of sustainable materials and finishes, Jones (2008) noted that resource available to the interior decorators is a challenge. As stated by the author, although there are guidelines on environmentally sustainable construction and specifications regarding sustainable practices, resources that are available to the designers are scarce. Sorrell (2009) also stated that natural paints that are available in the market often use synthetic-based ingredients or natural solvents containing VOCs. Thus, these paints cannot be called as ecofriendly. Moreover, the oil-based often contain lead and other heavy materials and the fumes from these paints contain hydrocarbons and high level of VOC content (Kim et al., 2011)

One of the most significant uses of sustainable practices in the hospitality sector can be seen from the efforts of the Six Senses luxury hotel group. As noted by Martin (2018), the brand has adopted the principles of sustainability in its core mission. Vision and have chosen sustainable local renewable materials like natural fibres, certified wood, recycled materials, eco-friendly fabrics and flooring throughout the property. As noted by the author, the hotel also uses non-toxic cleaning methods to maintain the indoor environment. Six Senses also has adopted a 'Zero Waste' philosophy and manages waste by collecting, composting, as well as reusing and recycling it (Newsletter.sixsenses.com, 2017). Another example from the hospitality industry, as highlighted by Bobbett (2010) is the sustainability practices of Accor hotels. The hotel uses low VOC paint, and the flooring is made of recycled hardwood. Such eco-friendly initiatives can improve sustainability in interior design and reduce the impact on human health and the environment. Although there are instances of adoption of sustainability in the hospitality sector, those do not particularly address the same in terms of interior design finishes. Addressing this gap, the present research sought to identify

the sustainable practices related to interior design finishes in the hospitality sector and the guests' perception of such practices and efforts.

### **2.5.2 Material selection**

In all design projects, material selection is one of the most significant aspects as it has the highest impact on the outcome of sustainability (Akadiri, 2015; Mate, 2009). By making the sustainable choice in terms of material selection, environmental impact can be considerably reduced (Kang & Guerin, 2009). This includes controlling the depletion of natural resources and less health impact on the occupants as well as the environment (Araji and Shakour, 2013). Although the importance of sustainable material selection has been widely accepted, there has been limited research on the interior designers' sustainable material selection (Lee, Allen, & Kim, 2013). This lack of research and knowledge creates challenges for the interior designers and the architects in implementing environmentally sustainable equipment, furnishing, and finishes. Moussatche, King, & Rogers (2002) conducted a study and revealed that the selection of material is primarily based on clients' needs, preferences, aesthetic sense, and cost, where sustainability is the least concern. This is primarily true in the case of the hospitality industry, where there is a potential conflict between maintaining high standards of design, meeting guests' satisfaction and implementing sustainable practices. It is because of this reason Sheehan (2015) stated that the hotel industry is considerably slow in applying green principles. Moreover, the perceived cost, knowledge of renewable materials, lack of expertise, and client resistance are some of the most common challenges in the adoption of sustainable materials (Mate, 2009; Lee et al., 2013).

However, hoteliers are now focusing on evaluating environmental achievements and are depicting their awareness (Cain, 2007; Han & Kim, 2010) in terms of environmental protection by using sustainable materials. For instance, carpet as a flooring material is one of the most commonly used elements in hotels that has a significant function in design like thermal insulation, comfort, and safety (Cain, 2007). The author also stated that in the selection of carpet, it is important to assess the type of fibre, its density and depth, construction methods, and the ability to clean. Apart from tiles, there are resilient Vinyl Composition Tiles (VCT) that consists of both organic and inorganic pigments (Cain, 2007). The organic portion has a greater amount of recycled substances (Riggs,

2003). However, polyvinyl chloride is a byproduct of its inorganic part and is, therefore, there is a growing concern related to VCT (Lent, 2003). Therefore, it is recommended to use ceramic tile with recyclable components that are proven to improve environmental performance (Lippiatt, 2002). Flooring can also be other renewable materials like linoleum, cork, bamboo and recycled rubber (Hayles, 2015).

In addition to tiles, Hayles (2015) also commented that fabric selection is also important and should consider chemical substances in the manufacturing process as it can potentially lead to air and water pollution. Moreover, it is important to consider its renewability. For instance, if there is a synthetic fibre, it will be recyclable. Moreover, if the fabric lasts for a longer time, it can be considered as environment-friendly (Hayles, 2015). As noted by Cain (2007), there are various software-based databases like BEES (Building for Environmental and Economic Sustainability), Simapro, Envest II, and Athena that can help to evaluate the materials or products based on their extent of sustainability. This can potentially help to solve the sustainability questions related to material selection. Following this discussion, some of the sustainability parameters that are commonly considered in sustainable material choice are discussed.

**Durability:** The aspect of durability has a close connection with sustainability (Fletcher, 2012). The length of product lifetime increases the utility, reduces the consumption of resources; waste can be reduced while meeting the essential needs (Fletcher, 2012). Thus, the durability of infrastructure also depends much on the pace at which materials deteriorate and thus positively or negatively influences spending on maintenance (Schlangen and Sangadji, 2013). Researchers have recently focused on durability in sustainable infrastructure design. For instance, Nathaniel et al. (2020) noted that usage of sustainable and durable concrete could significantly reduce greenhouse gas emission and prevent global warming. While durability has been recognised as an important aspect of sustainability, there remains a lack of agreement on the employment of the criteria in sustainable interior material choices. Such gaps have been addressed by the present research.

**Recyclability:** Recyclability and sustainability are closely interwoven, and in material selection, this is one of the significant criteria. Demir et al. (2013) noted that there are two types of waste; one that is generated after all the possible usage of the materials and the other one that can be

recycled or reused. For instance, wood waste can be used and recycled. In addition, marble pieces can be reused as raw material for the production of lime, cement, as well as plaster materials (Demir et al., 2013). LEED (2019) has also emphasised the importance of recyclability of materials to preserve resources and foster sustainability goals. The guideline also recommends waste construction management plan in the building construction to understand which materials are to be disposed of completely and which wastes to be sorted separately for reuse or recycling (Keller, 2016). Ahn and Pearce (2013) noted that hotels are also using recycled materials like gypsum (with 100% recycled materials), staircase steel (50% recycled substance), and asphalt (25% recycled content) in the interior as well as exterior designs. Following such findings and LEED recommendations, the parameter has been selected for assessing the sustainable material choice by the interior designers.

**Aesthetics:** There exists a common argument about aesthetics of the sustainable architecture (Khetani, 2020). It is argued that there has not yet emerged a distinctive, sustainable style that preserves the aesthetic value of the built environment (Khetani, 2020). In the hotel sector, aesthetic aspects have received significant attention as a pleasing interior design shapes the lived experience and consumption pattern of the customers (Alfakhri et al., 2018). The inherent conflict between sustainability and aesthetic, thus creates a challenge in material selection and may affect the hotels' orientation towards sustainability. Such aspects have been addressed by understanding the aesthetic value of the materials selected by the hotel interior designers.

**Sound absorption:** Any form of noise or undesirable sound is regarded as an environmental stressor or pollutant (Selvaraj et al., 2019). It can have a detrimental physiological or psychological effect on the occupants leading to sleep disturbances and another adverse effect on health (Na, Agnhage, & Cho, 2012). It is because of such reasons sound-absorbing material selection has been emphasised. As noted by Selvaraj et al. (2019), materials that can absorb sounds can dispel incoming sound waves. Carpets, for instance, which is widely used in the hotel interiors, are well-known for its acoustic properties (Küçük & Korkmaz, 2017). However, there are various other materials that can promote sound absorption that is addressed by this study.

**Maintenance:** Maintenance as a core function has a significant influence on the sustainable operation of the built environment (Malina, 2012). As noted by the author, preventive maintenance has been adopted by the planners to ensure the sustainability of the operation in the long-run (Malina, 2012). Jasiulewicz-Kaczmarek (2013) noted that maintenance is incorporated into the firms' overall sustainable strategy owing to its benefits in terms of cost, the safety of the interior environment, and impact on the external environment. However, from the past studies, little can be determined regarding the maintenance of different kinds of interior materials that ultimately impact the overall performance and operation of the indoor environment. Thus, this aspect of sustainability has also been taken into consideration for sustainable material selection.

**VOC:** VOC emissions are significantly linked to adverse health outcomes and therefore, is one of the major concern in sustainable building material selection (Lv & Yang, 2019). As noted by the authors, it leads to indoor air pollution, and it is because of such reasons controlling the source of emission is required through effective material selection. As noted by Simon et al. (2020), various physical properties of materials like density, surface hardness, water absorption, and the like can be used to understand the rate of VOC emissions. Furthermore, the temperature and humidity in the indoor environment can also impact VOC emission (Lv & Yang, 2019). Owing to the adverse health impacts, LEED (2019) recommended that VOC emissions have to reduce by 100%. Such guidelines have informed the selection of this parameter in the chosen study to assess the sustainable material choice.

**Waste Construction:** Waste generation has been one of the significant aspects to be considered for ensuring sustainability (Ibrahim, 2016). As pointed out by Demir et al. (2013), the two types of waste are usually generated during the construction phase, one that can be reused and recycled and the other one that cannot be reused or recycled. Such aspects are needed to be considered while selecting materials. For instance, plastics that are known for a high waste generation (Ayeleru et al., 2020) can be avoided as a material. On the other hand, wood waste can be reused for producing particleboard (Azambuja et al., 2018). Such considerations are required in the material selection phase and thus has been chosen as a sustainability parameter in this study.

**Fire resistance:** Fire resistance must be considered in architectural design and is considered as an important aspect of sustainability (Rahardjo & Prihanton, 2020). Fire outbreaks, while can negatively impact the stability and integrity of the buildings, can also lead to safety concerns and property damage (Rubaratuka, 2013). As noted by Bezas, Nikolaidis, and Baniotopoulos (2017) temperature of the materials often changes that leads to changes in its basic structural properties. Such aspects thus needed to be considered during the selection of materials and thus has been incorporated in this chosen study.

**Moisture resistance:** Damage of infrastructure due to moisture absorption is a common phenomenon and is manifested in cracking or pumping of the architecture (Yao et al., 2017). Such considerations are thus important to ensure the sustainability of the built environment. For instance, while wood has low moisture resistance capacity (Tamrakar & Lopez-Anido, 2011), Corian has high water-resistance (Corian.com, 2015). Therefore, this would be an important consideration for material selection.

**Cost:** Finally, the cost has also been one of the prime consideration in material selection (Zhao et al., 2016). To this end, there have been several models to assess the optimum material choice with respect to choice (Dmello et al., 2016). From there, it can be stated that along with ensuring the sustainability indicators of materials, it is also important to assess the cost aspect in order to maintain the budget.

From the discussion so far thus, it is clear that a number of sustainability aspects needed to be considered prior to selection of materials. A robust assessment of these parameters can help understand the performance of the materials in terms of sustainability and help interior designers to make the appropriate choice. In addition to sustainability, the aesthetic component also has been relevant in the luxury hotel sector that aims to provide a premium experience to its guests. However, prior research studies have not clearly provided an understanding related to interior material choice and particularly in the hotel industry. Such gaps necessitated the present study that seeks to gain an understanding of sustainable material choice by the hotel interior designers.

## 2.6 Strategies to integrate sustainability in interior design

A number of strategies can be implemented in order to integrate the concept of sustainability in interior design practices. These are as follows.

**Materials-related strategy:** Ahn & Pearce (2013) stated that firms must employ green principles in terms of resources and material selection and attempt at reusing, recycling content. As noted by the author, the usage of regional products and green furniture is also one of the significant strategies that can promote sustainability in interior design. Ayalp (2012) stated that furniture is one of the significant aspects of interior design work and finishing. In terms of the material selection for furniture, the author suggested that woods can be used that are recyclable. Thus, it can be stated that recycling is one of the major strategies in sustainability. However, as stated by Ayalp (2012), often the aesthetics are damaged for the recycled products. This aspect is significant for the hotel industry that attempts to provide the customers with the ultimate luxury experience. In this regard, Six Sense luxury property's usage of recycled woods for furnishing and floors (Villa-Clarke, 2017) can be regarded as one of the most significant sustainable strategies in terms of material selection. Material-related strategies may also incorporate assessment of the sustainability parameters as discussed in the above section that may facilitate comparison between materials and promote the appropriate selection. Such aspects have been discussed in the chosen research.

**Improvement of the quality of the indoor environment:** In the design phase, improvement of indoor environmental conditions is one of the significant considerations (Ahn & Pearce, 2013). As stated by the author, the designers' decision related to design can have a significant influence on the indoor environment and impacts on the hotels' guests' level of comfort as well as satisfaction. Therefore, it is extremely important that the designers use adaptable and durable finishes and reuse the furniture if possible. As highlighted by the LEED framework 2019, it is important that indoor air contaminants are controlled by choosing those products that are low in VOC (LEED, 2019). Moreover, ventilation and air quality are also significant considerations. In addition, Demirkan & Afacan (2018) also stated that the use of natural daylight could improve the interior environmental quality. Thus, the author proposed renewable sources of energy like sunlight, water, wind, and geothermal energy should be considered during the process of interior design.

**Operational strategies:** Ahn & Pearce (2013) stated that sustainability should be incorporated into the operational strategies of the firm. In other words, green building strategies can be adopted that can address a number of sustainability concerns like material choices, maintenance plan, use of chemicals as well as commissioning plans. Thus, it can be stated that LEED Framework of green building can be employed to evaluate the environmental performance (LEED, 2019).

These strategies, as discussed above, can be implemented to make sustainable interior design and improve the environmental performance of the hotels. However, such strategies have to align with the guests' expectations. This is discussed in the next section.

## **2.7 Summary**

The chapter provided a detailed insight into various practices related to sustainability in interior design and finishes. A particular focus has been given on material selection in terms of sustainability. The discussion highlighted several sustainability indicators and the way the same can be used to evaluate the sustainability of materials and also facilitate comparison. Based on this foundation, the present research explored in the context of the UAE hospitality industry to understand the extent to which the big luxury hotels are adopting sustainability in interior design and the challenges they are facing. The next chapter discussed the methodological approach chosen for this research.



## **Chapter 3 Research methodology**

### **3.1 Introduction**

The primary aim of the research is to gain insights from the interior designers regarding the implementation of sustainability in the luxury five-star hotels' interior design in the context of the UAE. To achieve this aim, the following questions were developed: how sustainability is implemented in the UAE's five-star hotels' interior design; how LEED guidelines are incorporated into the hotels' interior design in the UAE; what are the challenges in incorporating sustainability in luxury hotel interiors in the UAE; and how do the interior designers ensure a sustainable choice of materials for the UAE hotels' interior design? This chapter hence, outlines the research philosophy that has been adopted in this research as well as the research approach that has been selected. In addition, quantitative research design is also outlined, followed by data collection and analysis. Furthermore, details regarding the data collection and analysis have also been presented, which are followed by research sampling. Finally, the chapter outlines the ethical considerations.

### **3.2 Research philosophy**

Research philosophy, as understood by the scholars, are referred to the worldview or the underlying assumptions of the researchers that helps them to conduct a particular research study (Creswell and Creswell, 2018). It is broadly classified into ontology and epistemology (Easterby-Smith, Thorpe & Jackson 2015). There are two assumptions that can be made in ontology: either the world is constructed by social actors or the world is based on external aspects (Saunders, Lewis & Thornhill, 2012). The main assumption in the present study is that the world is constructed by social actors. In other words, the present research is based on ontological research paradigm that studies social phenomena from an objective point-of-view (Saunders, Lewis & Thornhill, 2012) and approaches the research from an interpretivist philosophical standpoint. There are two stances that researchers can adopt: interpretivism and positivism (Saunders, Lewis & Thornhill, 2012). One of the primary differences between the two philosophical stances is that in positivism, the objectification and reductionism is the focus, whereas in interpretivism, the subjectivism and exploration is the focus (Easterby-Smith et al., 2015). The present study has adopted interpretivism due to the fact that the primary aim of the study can only be achieved in a subjective manner. The

primary purpose of the research was to gain insights from the interior designers regarding the implementation of sustainability in the luxury five-star hotels' interior design in the context of the UAE. Moreover, the study focused on evaluating the implementation of sustainability in the UAE's five-star hotels' interior design, analysing how LEED guidelines are incorporated into the hotels' interior design in the UAE, assessing the challenges in incorporating sustainability in luxury hotel interiors in the UAE, and examining the sustainable choice of materials by the interior designers for the UAE hotels' interior design. Here, an interpretivist research philosophy is well-aligned with the core purpose of the research. This philosophy helped the researcher to look at the situation subjective and gain expert opinion and insight into the nature of sustainability that is implemented in the UAE's luxury hotels. Furthermore, the choice of the interpretivist philosophy follows from the need to gain deeper insights into how interior designers in the UAE are selecting their materials and where does the sustainability consideration factor in. This choice was also made in line the research by Ahn and Pearce (2013) who have also used a similar approach. However, the research by Ahn and Pearce (2013) also validated their results using the survey method; only an interpretivist approach is carried out in this study due to the limited scope of the present study.

### **3.3 Research approach**

Lewis, Thornhill, and Saunders (2012) stated that research approach could be inductive and deductive that studies the research phenomena in two different directions. A deductive approach allows for the testing of an existing theory using a highly structured methodology whereas an inductive approach is when the researcher is interested in generation of theory (Lewis, Thornhill, and Saunders, 2012). A deductive approach is also associated with hypothesis testing and is applicable in areas where there is substantial research conducted whereas an inductive approach is applicable when there is limited research conducted in the field of research (Easterby-Smith et al., 2015). For this research, an inductive approach is suitable because it requires a detailed exploration. Moreover, Lewis, Thornhill, and Saunders (2012) stated that deductive logic is applicable when the research is quantitative in nature and seeks to gain measurable research outcome for the study, which is not the objective of the current research.

The choice of an inductive approach was supported by the fact that the present research aims at understanding how sustainability is embedded and how it needs to be further embedded in the interior design of luxury hotels in the UAE. In addition, an inductive approach is exploratory in nature (Easterby-Smith et al., 2015) which allows the development of theory following the exploration of the data. This fits in line with the aim and objectives of the study.

### **3.4 Qualitative research design**

There are three types of research designs that can be used: qualitative, quantitative, and mixed methods. A quantitative design allows the collection of data using a questionnaire and

According to Creswell and Creswell (2018), qualitative research studies are those that aim at developing a subjective understanding of a research phenomenon. The design of such research studies follows inductive reasoning, whereby the researcher conducts a thorough analysis of the chosen research issue and then applies the analysis, theories, and concepts within the research's context. Such a design was found to be suitable in this given research because the research is directed towards analysing the nature of sustainability incorporated in the UAE hotels' interior designs.

### **3.5 Data collection and analysis**

For the present research, both primary and secondary data sources have been selected. Primary data, according to Hox and Boeije (2005), refers to the first-hand information collected by the researcher to gain knowledge of the actual research setting. For this study, primary data has been collected from the hotel managers of the 5-star hotels to gain insight into the hotels' sustainable choices. These include the extent to which LEED guidelines are incorporated in the interior design, consideration of using recycled materials, and other sustainability practices. The interview guide is prepared contained.

The data collected from the participants have been analysed with the help of by using qualitative analysis. The analysis of the qualitative data will be conducted using a process called Thematic Analysis. This process of data analysis is best suited for the present research as it allows the researcher to evaluate the data and develop the themes and categories. For instance, the qualitative data from the semi-structured interviews have been analysed using template thematic

analysis method (Braun and Clarke, 2013). Template analysis is one of the procedures of data analysis that allows the researcher to carry out a systematic and strategic analysis of the data. Emergent and existing themes from the data are analysed, and insights are derived from the data.

### **3.6 Research sampling**

The present research has gathered the sample based on purposive sampling method as. Bryman and Bell (2012) stated that purposive sampling is a non-random sampling method that helps to select those participants well-suited for the study. In this sampling method, the research selects respondents with a purpose in mind. Since the study is aimed at understanding the current sustainable practices and understand the perceptions of interior designers, the research needed those participants who have detailed knowledge about the hotels' sustainable practices in terms of interior design. All the designers have more than five years of experience in the industry and thereby possess adequate knowledge of sustainability practice. A total of 6 interior designers were selected for this research. The sampling method helped to recruit those respondents who have knowledge of sustainability and green practices in the hotel industry.

### **3.7 Interview Guide Development**

Insights to develop the interview guide were obtained from the literature review. These questions have emerged from the literature review that was conducted in Chapter 2. As discussed in the literature review, the challenges in incorporating sustainability for five-star hotels as well as some of the material decisions that need to be considered by interior decorators.

The following open-ended questions were developed:

1. What are the challenges in incorporating sustainability in luxury hotel interiors?
  - a. How do you think the challenges can be resolved?
2. Do you incorporate LEED guidelines in planning the hotel interior? Please elaborate how and in which specific area.
3. What kind of material do you normally use for hotel interiors like for?

- a. Floors
  - b. Walls
  - c. Ceiling
  - d. Joinery
  - e. Window Treatment
4. What criteria guide your choice of material?
  5. How do you ensure that the selected materials are sustainable?
  6. Does the implementation of sustainability diminish the aesthetics of the hotel interiors?  
Please elaborate on why you think so.
  7. Please rate the following materials on a scale of 1 to 7 based on sustainability criteria listed in the left-hand column. Please use this rating scale as described below and populate the below table with numbers from 1 to 7.

<b>Criteria</b>	<b>Plywood</b>	<b>Wood Veneers</b>	<b>MDF</b>	<b>Corian</b>	<b>SOLID WOOD /HARDWOOD AND SOFTWOOD</b>
Durability					
Recyclability					
Aesthetics					
Sound Absorption					
Maintenance					
VOC					
Waste Construction					

Fire resistance					
Moisture resistance					
Cost					

*Source: Chapter 2 and Interviews*

*Note: the criteria are outlined in Chapter 2, and the materials are outlined by the participants themselves during the interview in question 3.*

### **3.8 Ethical considerations**

In all kinds of research, it is important to keep in mind the various ethical considerations. For instance, Bryman and Bell (2012) stated that it is extremely important to gain voluntary consent from the participants prior to the data collection. In order to maintain such ethical considerations, the researcher provided the required information about the research and assured the respondents about data confidentiality, anonymity, and integrity. It was clearly mentioned that participation in the research is completely voluntary, and the respondents have the right to decline without stating any reason. Those who expressed unwillingness were allowed to leave without any negative consequences. In addition, no personal data has been collected from the respondents that can potentially cause identity revelation. Finally, strict adherence was maintained to academic research protocols like plagiarism, data manipulation, and data representation.

### **3.9 Summary**

The present research chapter provided an outline of the methodological framework based on which further analysis has been carried out. Following the research approach and design, the next chapter presents the findings of the research and attempts to derive answers to the research questions.

## Chapter 4 Findings and Analysis

### 4.1. Introduction

The present study began with the aim of gain insights from the interior designers regarding the implementation of sustainability in the luxury five-star hotels' interior design in the context of the UAE. In order to meet the central aim, the following questions were developed: how is sustainability implemented in the UAE's five-star hotels' interior design; how are LEED guidelines incorporated into the hotels' interior design in the UAE; what are the challenges in incorporating sustainability in luxury hotel interiors in the UAE; how do the interior designers ensure a sustainable choice of materials for the UAE hotels' interior design? To answer these questions, the researcher carried out qualitative, semi-structured interviews with six interior designers with substantial experience in interior designing for luxury hotels and expertise in managing LEED guidelines. The interviews were recorded and transcribed in verbatim. Thematic template analysis was used to analyse the data generated through the interviews. This chapter, hence, provides the participant profile before discussion the extent and challenges of implementing sustainability in the UAE's luxury hotels. Furthermore, the incorporation of LEED guidelines in the interior design of luxury hotels is discussed, and the sustainable material choice is outlined in detail in line with the data.

### 4.2. Participant Profile

A total of 6 participants agreed to participate in the study and provided their responses. They were selected using a purposive sampling method. The below table 2 outlines their profile and depicts that they were well-experienced and suited to participate in this study. Participant codes have been provided to ensure the anonymity of the participants.

*Table 2: Participant Profiles*

<b>Participant Code</b>	<b>Years of Experience</b>	<b>Educational Qualification</b>	<b>Current Position</b>
1 Participant	10 years	Bachelors	Design Manager
2 Participant	5 years	Masters	Interior Designer
3 Participant	6 years	Bachelors	Interior Designer
4 Participant	15 years	Masters	Design Head
5 Participant	8 years	Bachelors	Interior Designer
6 Participant	19 years	Bachelors	Design Director

From the above table 2, it is evident that the participants conformed to the selection criteria specified and were qualified to provide the appropriate extent of information that was needed from the participants. In addition, due to the participants being all interior designers, the sample is appropriate for the research.

### **4.3. Implementation of Sustainability in UAE’s Luxury Hotels – Research Objective 1 & 3**

The first objective of the research was to evaluate the implementation of sustainability in the UAE’s luxury hotels whereas the third objective of the research was to understand the challenges in implementing sustainability in the UAE’s luxury hotels. These two research objectives are being met in this section. The results indicated that implementing and maintaining sustainability within the UAE’s luxury hotels was outlined to be dependent on several factors. All of the participants outlined that the concept of sustainability and luxury did not associate well with one another as the concept of luxury is excess. For instance, Participant 2 noted, *“See, the thing with mixing luxury and sustainability is that it is difficult to have something luxurious and also sustainable. When we are looking to design a 5 or 7-star hotel in the UAE, we are not concerned about sustainability and are*



*only concerned with creating the feeling of lavishness and excess. This has to change, however, because sustainability is important, and we need to find a way to make luxury sustainable. But yes, luxury items are rarely sustainable*". In other words, the participant has noted that the concept of sustainability is far removed from the concept of luxury, but that bringing these two concepts together is essential.

A similar concept was outlined by Participant 1, who said, *"It is difficult to implement sustainability within luxury because with sustainability, we always try to use less and ensure that everything is energy efficient. But with luxury, the main thing is to show style and elegance. Sometimes it is about grandiosity, but other times it is about class; depending on client vision."* Similar insights were provided by Participant 3 and 5 such that the concept of luxury is about creating an indulgent environment where the high-end luxury items are never sustainable. Therefore, the participant outlined a challenge in the implementation of sustainability in the UAE's luxury hotels, such the very concept of luxury defines wastage and non-sustainability, which is difficult to reconcile.

On the other hand, one participant outlined that while it is true that sustainability and luxury are not completely compatible, they noted that it is the responsibility of the interior designer to bring as many sustainable aspects into the space as possible. In other words, Participant 6 noted that, *"After many years of experience, I usually try to embed sustainability into interior design as much as possible; and which I believe is the job of an interior designer. Yes, sustainability is at the background in luxury design, but we, as interior designers need to push the envelope and create luxurious spaces with sustainability embedded into space"*. Therefore, the implementation of sustainability in luxury hotel design is a matter of innovation and creativity from the interior designer.

This disconnect between sustainability and interior design that has been identified above has also been reflected in past research. More specifically, Ahn and Pearce (2013) have outlined that sustainability and luxury interior design are in conflict with one another with the focus of hoteliers being on indulging the client in an experience rather than focusing on sustainability. A similar insight was provided by Heide & Gronhaug (2009) who noted that hoteliers are primarily concerned with

the aesthetics of a space and often compromise on sustainability and use those materials that uphold the design aesthetics. Furthermore, Moscardo (2017) stated that interior design practices are in direct conflict with sustainability, which is in line with the responses of the participants presented above.

While participants identified the conflict between the interior design requirements for a luxury space versus sustainability, some of the participants also noted that there is a shift in the dialogue as manufacturers of luxury goods are attempting to embed sustainability practices into their manufacturing practices. For instance, Participant 6 stated, *“As the world is getting more aware of sustainability and its advantages, lots of manufacturers are into producing a sustainable product and yet keep their looks and feel.”* This insight provided by the participant is in line with past research that has outlined that there is a shift in the requirements of hoteliers such that many hotels are seeking to adopt green and sustainable management practices into hotels (Reid, Johnston, & Patiar, 2017) with concepts of water, land, and energy efficiency, pollution and waste management, and implementation of innovation (Wei, Ramalho, & Mandin, 2015).

Finally, some of the challenges that were identified by the participants with respect to implementing sustainability pertained to the cost of the same. In other words, several participants noted that when sustainability is incorporated into the design, the cost established increases beyond the budget. For instance, Participant 5 noted, *“the challenge that I most face in bringing sustainability into the hotel design is the cost. The problem is that the initial cost is very high, and that is something the clients are not prepared for. For example, if we use solar power, the initial cost is very high, but long-term, there are huge cost savings. But clients are not willing to extend the budget, and so we have to stick with the same”*. Participant 6 also echoed the same, *“as long as the cost is not managed for going sustainable, hotels will not do it. Clients don’t consider long term benefits and are focused on short term budgeting”*.

In addition, participants also identified that there is also client resistance due to lack of knowledge regarding the acceptance of sustainable products into the interior design of the hotel. In other words, Participant 4 stated, *“Clients are also not aware of the benefits that sustainability brings, and they assume that it will affect their aesthetics that they have envisioned. Because of this, they actively resist and challenge the decision to incorporate sustainability into the design elements”*.

This is accordance with past research that has identified that some of the challenges of adoption of sustainable materials, apart from the cost, includes lack of knowledge of renewable materials, and client resistance (Mate, 2009; Lee et al., 2013).

Overall, it can be stated that while interior designers are knowledgeable and willing to incorporate sustainability into luxury hotel's designs, the clients, due to their perceptions, are not ready to accept the same. Furthermore, participants have also outlined there is a conceptual disconnect between sustainability practices and the perception of luxury.

#### **4.4. Incorporation of LEED Guidelines in Interior Designs – Research Objective 2**

Incorporation of LEED guidelines during the material selection process for interior design has not received much attention in past research. As such, in line with one of the objectives of this research, participants were asked to share insights into how they incorporate LEED guidelines into their interior design material selection process. Several participants indicated that they only follow LEED guidelines if the project is supposed to be carried out under LEED guidelines. In other words, Participant 2 noted, *"I only use LEED if the project is specified to be done with LEED guidelines. When this happens, I only use LEED-certified materials. And it is mostly done at the selection stage where the materials are being specified and coded for the project"*. This depicts that LEED standard is not followed unless it is mandatory to be followed. This can be potentially limiting the implementation of sustainability in the UAE's luxury hotels.

In addition, Participant 1 noted, *"Yeah, LEED is used, but only when the client wants the project to be in line with LEED guidelines"*. Similarly, Participant 3 outlined that, *"I try to refer to the LEED material specification list to make sure I am using as sustainable materials as possible, but it is difficult to do so when the clients are not willing to do a LEED-certified project"*. Finally, Participant 6 stated, *"See, I try and use LEED guidelines to select my products and materials, but it is not easy to convince the client. If the client is on board, then great! But using LEED generally is not quite feasible without the client's express interest or approval"*. Therefore, it can be said that the implementation of LEED is challenging, which leads to a limited implementation of LEED into luxury hotels' interior design.

The use of LEED is beneficial for the selection of interior design material due to the fact that LEED has established guidelines for interior design and construction, and operation and maintenance of the buildings in the hospitality sector (LEED, 2019). Because LEED-certified hotels are more water and energy-efficient than non-LEED certified ones, there is a growing need to ensure that LEED is incorporated into the hotels interior design (Behnke, 2018).

Overall, the general attitude of the participants is that LEED is only used if and when there is a requirement for it. Though the participants place importance on the need to establish sustainability, they are bound by the requirements of the client and the project itself. Perhaps with a change of such an attitude towards sustainability in interior design, more hotels will be able to accept the use of LEED guidelines for their design projects.

#### **4.5. Sustainable Material Selection – Research Objective 4**

In order to understand how the interior designers ensure a sustainable choice of materials for the UAE hotels' interior design, they were first asked to outline some of the most common materials that they use for any given luxury project. Some of the materials that the participants use for flooring include Solid Wood, Parquet or Engineered Wood, Porcelain and Ceramic Tiles, Marbles, Micro Topping, Vinyl, Terrazzo, Concrete floor, Rugs, and Carpet. For joinery, on the other hand, plywood, wood veneers, MDF, Corian, Solid wood/hardwood and softwood. Furthermore, for the walls, the participants outlined that they use wallpaper, marble/tile cladding, wood panelling, glass wall, and paint/ decorative paint. For the ceilings, participants stated that the most commonly used materials are decorative/ plain plastered gypsum, wood panel, and glass/mirror. Finally, for window treatments, the participants reported using wooden blinds, shade (plastic/steel), and fabric curtain. Once these materials were outlined by the participants, sustainability criteria were used to evaluate these materials: Cleaning, Durability, Recyclability, Aesthetics, Sound Absorption, Maintenance, VOC, Waste Construction, Fire resistance, Moisture resistance, and Cost. Participants were asked to rate the materials based on these criteria obtained from past research on a scale of 1 to 7 with one being 'very poor' to 7 being 'exceptional'.

All of the participants provided their responses on each of the material and each of the criteria. The scores for each material across each criterion for each participant were averaged to obtain an

average rate. For instance, if each of the six participants rated plywood on the basis of durability as 4, 5, 4, 5, 3, 4 respectively, then the average durability rate for plywood would be 4.2. The below table 3 presents the average rates for joinery materials.

*Table 3: Choice of Joinery Materials*

<b>Criteria</b>	<b>Plywood</b>	<b>Wood Veneers</b>	<b>MD F</b>	<b>Corian</b>	<b>Solid Wood /Hard Wood And Soft Wood</b>
Durability	4.2	5.0	2.0	5.0	6.2
Recyclability	4.2	2.8	5.3	3.0	2.2
Aesthetics	4.2	4.0	2.2	3.0	5.0
Sound Absorption	5.3	3.8	3.8	2.0	5.0
Maintenance	3.0	4.3	2.0	4.8	2.2
VOC	3.0	3.0	2.0	2.0	5.0
Waste Construction	3.8	3.2	4.0	3.2	2.2
Fire resistance	2.3	2.0	2.0	4.0	2.0
Moisture resistance	1.8	2.0	1.0	6.0	1.8
Cost	3.0	3.0	4.0	3.0	1.8
Total	34.8	33.2	28.3	36.0	33.3

From the above table, and then based on the ratings that are provided by the participants, the material with the highest sustainability rating is Corian for joinery. Corian rated particularly high in moisture resistance, good maintenance, durability, and fire resistance. Following Corian, the second most sustainable joinery material is plywood which scores high in durability, recyclability, aesthetics, sound absorption, and flooring. As Corian and Plywood differ in their individual sustainability scores, designers can choose between the two based on their requirements of the project or from the client.

Similar to the above, the following table 4 outlines the most common materials used by interior designers for their flooring needs. These materials were outlined by the participants during the interview and were rated by them.

*Table 4: Choice of Flooring Materials*

Criteria	Solid Wood	Parquet/Engineered Wood	Tiles/Porcelain An Ceramic Tiles	Marbles	Micro Topping	Vinyl	Terrazzo	Concrete Floor	Rugs	Carpet
Cleaning	2.0	3.0	6.0	4.2	3.0	4.0	5.0	5.2	3.0	1.8
Durability	5.0	4.0	6.3	6.7	4.0	3.0	4.0	6.0	3.0	3.0
Recyclability	1.8	3.0	4.2	1.8	3.0	4.0	4.0	6.2	6.0	6.2
Aesthetics	6.0	5.0	5.0	7.0	3.0	3.0	2.0	3.0	3.8	4.0
Sound Absorption	4.2	3.0	2.0	2.0	2.0	2.0	2.0	2.0	6.0	6.0
Maintenance	2.0	3.0	5.0	4.8	4.0	3.3	3.7	4.0	3.0	3.0
VOC	6.3	3.0	3.0	5.8	2.0	2.2	3.0	1.8	3.0	3.0
Waste Construction	2.0	3.2	4.3	1.8	2.8	4.0	4.2	4.8	5.2	5.0
Fire resistance	2.0	2.2	6.0	6.0	4.0	2.8	4.0	5.0	2.2	1.8
Moisture resistance	1.8	3.0	5.2	5.0	5.2	4.0	4.7	6.0	2.2	1.8
Cost	1.8	5.0	6.3	2.0	2.8	5.0	6.2	6.2	3.0	6.0
Total	35.0	37.3	53.3	47.2	35.8	37.3	42.7	50.2	40.3	41.7

The highest sustainability score has been allotted to porcelain or ceramic tiles due to their high fire resistance, low maintenance requirements, high durability and high efficacy in cleaning, aesthetics, waste reconstruction, and cost. In other words, porcelain and ceramic tiles are one of the best materials for flooring that does not compromise on the aesthetics, cost, and other parameters of sustainability. In addition, the second most sustainable material for flooring was concrete due to low cost, high fire and moisture resistance, high durability and recyclability, and efficacy in cleaning. Marbles was the third most sustainable material based on the ratings provided by the participants due to high durability, luxury aesthetics, low VOCs, high fire resistance, moisture resistance, and low cost. For ensuring sustainable flooring, interior designers can choose between porcelain and ceramic tiles, concrete, and marbles as these allow for a luxury aesthetic without compromising on cost or sustainability.

In accordance with the above, the following table 5 provides details with regards to the sustainability analysis of wall materials. Based on the below table, using a glass wall is the most

sustainable choice due to its easy cleaning capacity, aesthetics, low waste construction, high recyclability, and low cost. This is immediately followed by wood panelling which is also highly sustainable due to high durability, great aesthetics, low maintenance requirement, high moisture and fire resistance, and low cost.

*Table 5: Choice of Wall Materials*

<b>Criteria</b>	<b>Wallpaper</b>	<b>Marble/Tile Cladding</b>	<b>Wood Paneling</b>	<b>Glass Wall</b>	<b>Paint/Decorative Paint</b>
Cleaning	3.0	5.0	3.0	6.8	2.0
Durability	2.8	6.8	5.3	4.0	3.0
Recyclability	5.0	2.0	3.0	5.3	2.0
Aesthetics	6.2	6.7	6.2	5.0	3.0
Sound Absorption	4.8	4.2	2.0	2.0	3.2
Maintenance	2.8	5.0	4.2	3.8	3.0
VOC	1.7	3.7	3.3	2.8	1.8
Waste Construction	4.2	2.0	2.8	4.2	2.0
Fire resistance	2.0	5.8	2.0	5.2	3.0
Moisture resistance	1.8	5.2	2.0	6.2	2.0
Cost	5.2	2.0	3.0	4.2	5.0
<b>Total</b>	<b>39.5</b>	<b>48.3</b>	<b>36.8</b>	<b>49.5</b>	<b>30.0</b>

Similarly, the following table highlights the most commonly used materials and their sustainability ratings for the ceiling. Based on the below table, using a glass wall is the most sustainable choice due to its easy cleaning capacity, aesthetics, high recyclability, low cost, and low waste construction. Both wood panelling and the use of gypsum are equally comparable in terms of sustainability as depicted in the below table 6.



*Table 6: Choice of Ceiling Materials*

<b>Criteria</b>	<b>Decorative/ Plain Plastered Gypsum</b>	<b>Wood Panel</b>	<b>Glass/ Mirror</b>
Cleaning	2.0	3.0	6.3
Durability	4.0	4.0	4.2
Recyclability	2.2	4.2	5.0
Aesthetics	4.0	4.0	3.8
Sound Absorption	3.0	4.3	2.0
Maintenance	2.5	3.2	3.0
VOC	3.0	2.0	1.8
Waste Construction	3.8	2.8	4.8
Fire resistance	3.2	2.0	5.7
Moisture resistance	1.8	2.0	5.0
Cost	5.2	2.7	3.0
Total	34.7	34.2	44.7

Finally, for window treatments, the most sustainable materials, based on the participants, is the shade made of either plastic or steel due to efficient cleaning, high durability, low recyclability, low need for maintenance, low waste construction, high fire and moisture resistance, and low cost, as seen in the below table 7.

*Table 7: Choice of Window Materials*

<b>Criteria</b>	<b>Wooden Blinds</b>	<b>Shade (Plastic/Steel)</b>	<b>Fabric Curtain</b>
Cleaning	5.2	5.2	2.0
Durability	5.3	5.0	3.0
Recyclability	3.8	4.2	2.2
Aesthetics	3.0	3.2	5.0
Sound Absorption	2.8	1.8	5.0
Maintenance	4.0	4.0	3.0
VOC	2.8	2.7	5.2
Waste Construction	4.0	4.3	2.3
Fire resistance	3.2	4.2	1.2
Moisture resistance	2.7	4.0	1.8
Cost	4.0	5.2	2.8
Total	40.8	43.7	33.5

This analysis has provided essential knowledge regarding the sustainability of each material. Such an analysis was necessary due to the fact that there has been limited research on the interior designers' sustainable material selection (Lee, Allen, & Kim, 2013). This lack of research concerned because the perceived cost, knowledge of renewable materials, lack of expertise, and client resistance are some of the most common challenges in the adoption of sustainable materials (Mate, 2009; Lee et al., 2013). Furthermore, this lack of research and knowledge creates challenges for the interior designers and the architects in implementing environmentally sustainable equipment, furnishing, and finishes. Therefore, the understanding of how each material performs across various dimensions can allow interior designers to make informed choices regarding the same without compromising on the luxury aesthetic of the project.

#### **4.6. Summary**

This chapter has provided a detailed account of the participants' responses, analysed them, and grounded them against prior research. In addition, the chapter has outlined the extent of the implementation of sustainability in the UAE's luxury hotel industry and the challenges that the interior designers face. Furthermore, the chapter has also provided an insight into how and to what extent LEED guidelines are incorporated into the design specifications. Finally, this chapter has also presented some of the most common materials used by the designers as outlined by the participants as well as provided their sustainability rating also based on the participants' responses.

## Chapter 5 Conclusion

### 5.1 Summary of the research

The research was carried out with the aim to gain insights from the interior designers regarding the implementation of sustainability in the luxury five-star hotels' interior design in the context of the UAE. Furthermore, the purpose was to identify gaps and propose certain recommendations to integrate sustainability in hotels' indoor environment. A qualitative research methodology was adopted, and semi-structured interviews were conducted with expert interior designers. The results revealed useful findings that have significant practical application for the interior designers as well as the clients embarking on luxury hotel design.

One of the core findings from the research was that the concept of sustainability and interior design conflict with one another. In other words, there is a perception that by incorporating sustainability into space, the luxury will not be maintained. However, the results indicated that participants agreed that it is the job of the interior designers to innovate possible solutions for incorporating sustainability into the luxury space. In addition, some of the challenges that were identified by the participants included high short term cost of incorporating sustainability. Another challenge faced was the lack of client willingness to incorporate sustainability into the luxury design. All of the participants outlined that the concept of sustainability and luxury did not associate well with one another. The research indicated that implementing and maintaining sustainability in luxury hotels was dependent on several factors. The very concept of luxury defines wastage and non-sustainability, which is difficult to reconcile. Hoteliers' focus is on indulging the client in an experience rather than focusing on sustainability. Challenge of bringing sustainability into hotel design is the cost, according to participants. Manufacturers of luxury goods are attempting to embed sustainability practices into their manufacturing practices. Many hotels are seeking to adopt green and sustainable management practices into hotels. Sustainability in the hotel industry is becoming more mainstream.

In addition, another finding was that interior designers, due to the challenges above, only follow LEED guidelines if the project is supposed to be carried out under LEED guidelines. While

the participants agreed that they try to incorporate LEED into the choice of materials, onboarding the clients remains a challenge. LEED has established guidelines for interior design and construction. LEED-certified hotels are more water and energy-efficient than non-LEED certified ones. More hotels will be able to accept the use of LEED guidelines for their design projects only if the interior designers push the envelope with creativity and innovation.

Finally, the study also evaluated the choice of sustainable materials based on the most common materials used by the participants and rated them based on the sustainability criteria that were identified during the literature review. The ratings were also provided by the participants. Some of the materials that the participants use for flooring include solid wood, parquet or engineered wood, porcelain and ceramic tiles, marbles, micro-topping, vinyl, terrazzo, concrete floor, rugs, wallpaper, marble/tile cladding, wood paneling, glass wall, and paint/ decorative paint, decorative/ plain plastered gypsum, wooden blinds, shade (plastic/steel), and fabric curtain, MDF, and carpet. Amongst these materials, porcelain and ceramic tiles, Corian, plywood, marbles, concrete floor, wood paneling, and glass were considered to be the most sustainable. These are materials that are sustainable and do not compromise on the cost or sustainability and hence, can be chosen for ensuring sustainable interior design.

Therefore, it can be stated that the research successfully met its formulated research aim and objectives. It analysed the extent of incorporation of sustainability into the hotel's interior design and outlined some of the challenges. It also evaluated the use of LEED guidelines and carefully analysed the preferred material choices of interior designers.

## **5.2 Research implications**

The research has a number of practical applicability. For instance, the sustainable material selection matrix as developed may be used by the hotel interior decorators for selecting materials based on the criteria of sustainability. Using the matrix, the interior decorators can assess the sustainability parameters for each of the interior décor material and assess their performance prior to making a selection. These will ensure the indoor performance of the building as well as ensure the health of the guests.

Another useful implication of the results may be understood in terms of the interior designers' material preference. For instance, the findings of the study may be used by the interior design industry to devise strategies related to sustainability. The interior designers' preference may be taken into account while making the choice of materials for the interior design. What is important is to strike a balance between sustainability on one hand and clients' requirements as well as cost implications on the other.

Another useful implication of the study is that it is in line with the previous notions of previous researchers that sustainable choices compromise the service standards and interior aesthetics. The results obtained in this study vis-a-vis the insights of the interior designers revealed that sustainable choices do interfere with the aesthetics of the interior. Thus, following such results, the interior designers may implement interior design sustainability with more knowledge as to how it affects the design considerations and make sure that the cost and benefits of using sustainability into the design do not influence the luxury too much.

In addition, the findings of the study revealed a negative price perception among the interior designers related to green products and services. Such findings do have some important implications for the hotel industry. These results and findings can be taken into consideration to devise an approach that conveys the hotels' brand, environmental performance, and social commitment. It should also be tailored to attract the young generation as they are willing to pay a premium price for green products and services. However, the pricing strategy needs to attain a balance between the value delivered to the guests and the price charged.

### **5.3 Research limitations**

One of the primary limitations of the study is that the research employed only a quantitative approach. Due to the current situation of the country and COVID-19 pandemic, the research was limited only to one method, which was not enough to validate the results that have been so obtained.

Another limitation of the study is the small sample size. The sample size of the interior designers has limited that hindered drawing more detailed and comprehensive analysis regarding sustainability implementation in the hotel industry. In particular, the number of interior designers

was very few, and limited understanding could be gained in terms of their material choice and preference.

#### **5.4 Future research**

Future research studies may be conducted with a large sample size of interior designers. In addition to qualitative research, surveys may be conducted by future researchers to gain additional insights on sustainable material selection and strategies. Finally, studies can also think of covering the entire UAE region and analyse various 5-star properties to analyse the sustainability orientation in the hospitality industry. Such studies will generate reliable and replicable results that may be useful for the hoteliers in formulating strategies relating to interior design sustainability. Moreover, future researchers can explore more on the sustainable materials for interior design and create a comprehensive list of materials that can guide material selection by the interior decorators and the hotel managers.

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